

IE23SP Degree Programme in Mechanical Engineering (IE23SP)

Credits

240

Duration (years)

4

Language

English

Specifications**Degree**

Bachelor of Engineering

Degree title

Bachelor of Engineering

Degree programme

Degree Programme in Mechanical Engineering

Type of education

Bachelor's degrees, full-time study

Person in charge

Mirka Savolainen

Description**Description**

The degree title is Bachelor of Engineering in Mechanical Engineering. The title of the degree in Finnish is called konetekniikan insinööri (AMK). The study programme is 240 ECTS and the full-time studies take about 4 years. The studies take place in Kuopio and they are conducted in English. This programme qualifies to apply for master degree programmes.

The degree programme of Mechanical Engineering (specializing in Mechatronics) qualifies the future engineers for the various tasks in the technology industry. Duties vary within the fields of engineering, it may include planning, machine design, product development, production development, manufacturing, system development, management, maintenance and other industrial-related activities. The future job is most probably found in a in high technology companies working in international technology projects.

Studies include mechanical design, control system design: hydraulics, pneumatics, programming, robotics, and simulation, manufacturing and material technologies, 3D modelling, product design and development, electrical engineering.

Curriculum development and working life cooperation

In Savonia, the pedagogical starting point is the diverse combination of high-quality and working-life-oriented education and research and development activities. Co-development strengthens multidisciplinary activities, utilization of partnerships and closeness to working life.

Education close to working life emphasizes students' motivation and commitment to their studies. A variety of virtual and physical environments in Savonia and in partner organizations' facilities both at home and abroad connect theory and practice in an extensive and interesting way as part of the student's learning and the also the development of organizations. The education is characterized by multiformity, multidisciplinary and not bounded to time and place.

With comprehensive guidance, the student's professional growth is supported throughout the study path. In Savonia, every student is an individual. The training is carried out taking into account the different needs and goals of the students. Personalized education enables alternative methods of performance and individual paths according to the student's own goals.

In Savonia, the recognition of prior learning and the studification of work are used as part of the student's personal study plan when possible. Students can deepen or expand their skills by utilizing the offerings of Savonia's national and international higher education partners.

Responsibility, sustainable development and global human security challenges are taken into account in the contents and implementation methods of the annual themes and courses.

Close networking with local businesses, especially during project studies and internships, guarantees that the learning outcomes benefit both the student's career development as well as the local businesses.

The mechanical engineering programme is guided by OIS thinking (Open Innovative Space, OIS 2.0) and the CDIO method (Conceive Design Implement Operate). They emphasize project teaching and real case studies from worklife. The first year students will start with an orientation project to learn the basics of project working. Second year students will carry out a multicultural and multidisciplinary RDI Project solving cases assigned by local companies. During the last two study years students will have Mechanical Engineering Projects 1 and 2. The thesis can be seen as the final project that is usually carried out individually.

Objectives

In Savonia's curricula, the courses form broader study units. In this way, they support the overall development of the student and the development of expertise. At the same time, it becomes possible to combine teaching and working life-oriented research and development activities.

The curriculum for a Mechanical engineer is designed so that

- the degree produces the skills required in working life
- training ensures the development of the student's expertise.

Student

- prepares a personal study plan to support his/her studies, where previously acquired competence is recognized
- is responsible for the progress of his/her studies.

Savonia's teachers and other personnel guide and support in defining and achieving personal goals.

The Bachelor programme in Mechanical Engineering at Savonia UAS aims at educating future engineering experts learning product design and development, manufacturing technology and mechatronics. Mechatronics is an interdisciplinary branch of engineering that focuses on the integration of mechanical, electronic, electrical engineering systems. In practice mechatronic systems combine digital control system to mechanical machines powered with electricity or fluids (hydraulic or pneumatic systems).

Code	Name	Sum
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IE23SP-1019	Basic Studies	60
IM00BD21	Tools for International Engineering Students	5
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IE23SP-1023	Finnish or Swedish	5
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4_EXX8060	Engineering Swedish	5
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IE00BD61	Mechanical Engineering Project 1	5
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IE23SP-1022	Internship	30
EX00BD39	Internship 1	5
EX00BD40	Internship 2a	5
EX00BD41	Internship 2b	5
EX00BD42	Internship 3a	5
EX00BD43	Internship 3b	5
EX00BD44	Internship 3c	5
THESIS	THESIS	15
THESIS-1001	Thesis	15
XT00BA53	Thesis Planning	5
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XT00BA55	Thesis Finalisation	5
XT00BA56	Maturity Test	0

IE23SP IE23SP Degree Programme in Mechanical Engineering: 240 op

IE23SP-1015 Basic Studies: 60 op

Optionality

All compulsory

IE23SP-1019 Basic Studies: 60 op

Optionality

All compulsory

IM00BD21 Tools for International Engineering Students: 5 op**Credits**

5 - 5

Objectives

After completing the course the student is able to

- plan his/her studies and use the information, counselling and guidance services available in Savonia UAS
- find support when needed in order to progress with the studies according to schedules
- evaluate and develop his/ her studying skills
- use the necessary IT tools and applications in his/her studies
- communicate, work and study in a multicultural environment

Content

- Orientation to UAS studies
- IT applications and skills in engineering studies
- Communication and grouping in a multicultural community

Assessment scale

Five step scale

4_EXX8110 Mathematics 1: 5 op**Credits**

5 - 5

Objectives

The student revises the basics of algebra and trigonometry. He/she knows the basic properties of the most common functions used in technical applications. The student learns the elements of mathematical thinking and deduction. Furthermore, the student is able to recognize simple mathematical problems and solve them. The student achieves the readiness required to continue studying mathematics and to solve mathematical problems in engineering studies.

Content

- Laws of algebra of real numbers
- Equations and inequalities
- Linear systems of equations
- Trigonometry
- Elementary functions

4_EIA8010 Material Technology 1: 5 op**Credits**

5 - 5

Objectives

The aim of this course is that students get familiar with the most used materials in mechanical engineering, especially steels. Other materials discussed are cast iron and nonferrous metals. With different structural materials the scope is to understand mechanical properties of metals, manufacturing routes and service conditions subject to composition and internal structures of metals. These can be affected by heat treatment and degree of deformation. The fundamentals of material selection and fracture mechanics are also explored.

Within this study module also corrosion of materials, which is closely related to reduction-oxidation reactions as well as electrochemistry, is covered. During this study module students will take part in practical training in the laboratory of material technology.

Content

Material groups and manufacturing of metals
Internal structures of metals and its influence on properties of materials
Mechanical properties, definition within different ways
Effect of heat treatment and environmental factors
Different steel grades with their mechanical and corrosion properties and their weldability
Cast irons and nonferrous metals
Fundamentals of materials selection and fracture mechanics
Corrosion of materials
Reduction-oxidation reactions
Electrochemistry

4_EIP8010 Technical Drawing: 5 op**Credits**

5 - 5

Objectives

The student knows the basics of technical drawing, projections used in technical drawing, the markings and symbols, part and assembly drawings, parts lists, tolerances in machine design and machine parts modeling and drawing processes. The student also gets an understanding of the different machine construction documents, parts manufacturing drawings, assembly drawings, PI-diagrams, piping and layout drawings. The student gets acquainted with the three-dimensional parametric design tool for creating the assembly and part drawings. The basics in level and space geometry and geometrical constructions are covered.

Content

Basics in technical drawing
Scales, projections, sections views, line widths, texts, dimensioning methods, tolerances, fits, surface and welding symbols, diagrams and bill of materials
Part and assembly drawings and their link to product structures
Taking manufacturing into account when creating technical drawings (welding and milling assembly drawings)
Using a CAD program to create manufacturing drawings
Standards used in technical drawing
Level and space geometry

Geometrical constructions

Prerequisites

None

4_EIP8020 3D Modelling: 5 op**Credits**

5 - 5

Objectives

The students become familiar with machine components and assemblies modeling and drawing process, basics of parametric 3D design tool, parts sustainability, manufacturability and cost evaluation methods, configurations and modular assembly management. The students are able to draw welding assemblies and drawings, as well as model sheet metal parts and make manufacturing and unfolded drawings of sheet metal parts. The students will also know how to use product data management system.

Content

Parametric feature modeling's effective use in a machine design team.

Basics of product data management, SolidWorks WorkGroup PDM as well as the basics of SolidWorks Enterprise PDM in management and sharing of documents.

Parameterization, configurations and modular assembly management. Design Table. Assembly Features.

3D-sketching. Welded assembly drawings, welded beam structures and welding drawings.

Sheet metal parts modeling. Manufacturing and unfolded drawings of sheet metal parts.

Simulationxpress, static analyses.

Part manufacturability and cost evaluation using DFMXpress and SolidWorks Costing applications.

Prerequisites

None

IE23SP-1023 Finnish or Swedish: 5 op**Optionality**

Select one

IX00BF80 Basics of Finnish: 5 op**Credits**

5 - 5

Objectives

After completing this course, the student is able to

- use familiar everyday expressions and basic phrases
- introduce him/herself and others
- ask and answer simple questions
- interact orally in a simple way.

Content

Topics: getting to know each other, greetings, days of the week, numbers, countries, languages, weather, seasons, family, appearance, clock, apartment, traveling.

Grammar: personal pronouns, verb to be, change of consonants (KPT), types of verbs, questions, nominative plural, genitive, partitive, locatives.

Assessment scale

Five step scale

4_EXX8060 Engineering Swedish: 5 op**Credits**

5 - 5

IE00BG82 Orientation Project: 5 op**Credits**

5 - 5

Objectives

After completing the course, the student is able to

- understand how e.g. physics and chemistry are related to practical work in mechanical engineering
- perceive of what a project-based learning is about
- work independently and as a member of the project group
- understand, in a concrete way, a product development/ production process from an idea to a physical prototype.

Content

- Project management and project documentation
- Use of information technology
- The basics of natural sciences studies (physics, chemistry)
- The basics of the program-specific studies

Further information

The course is recommended to do simultaneously with the course 'Communication Skills for Engineering Students'.

Assessment scale

Five step scale

4_EXX8140 Physics for Engineering: 5 op**Credits**

5 - 5

Objectives

The general objective of the course is the introduction to the basic methods of physics. This includes the use of the SI system of units and a systematic mathematical way of analyzing physical systems.

The more specific topics of the course are the basics of temperature and thermal energy, and the Newtonian mechanics. The former includes phenomena like thermal expansion of solids, liquids and that of gases within the framework of the ideal-gas law. The student will also get to understand the energetics of the temperature changes and phase transitions.

The Newtonian mechanics is preceded by treatment of kinematics in one and two dimensions. Newtonian mechanics is about the Newton's laws and the student will learn to apply them to fairly simple systems in one and two dimensions. The student will learn to make use of the concepts related to the definition of work done by a force, i.e. energy, energy principle, and power. After having completed the course, the student is able to apply the conservation law of linear momentum for collisions. He/she will also learn to treat impulsive forces in terms of impulse of a force.

Finally the student will learn dynamics of circular motion.

Content

International System of Units (SI)
Thermal Expansion
Thermal Energy
Ideal Gas Law
Mechanisms of Heat Transfer
Kinematics
Newton's Laws
Friction
Work, Energy, and Power
Linear Momentum
Circular Motion

Prerequisites

None

4_EXX8120 Mathematics 2: 5 op**Credits**

5 - 5

Objectives

The student understands the meanings of the derivative of a function and the integral of a function. He/she knows the rules of differentiation and integration. The student is also able to apply the concepts introduced during the course in engineering applications.

Content

-Differential calculus
-Integral calculus

Prerequisites

Mathematics 1

4_EIP8040 Manufacturing Technology 1: 5 op

Credits

5 - 5

Objectives

The students get familiar with machine and metal industry's production methods, their principles and production equipment. The students understand the purpose of different manufacturing processes and know the products manufactured with the different processes. The students know the achieved accuracies and surface roughness through different manufacturing processes, and understand the factors related to the chosen manufacturing method. The students become familiar with the basic structure of CNC-machines and their programming. The students understand the importance of measuring and assembly technologies in the manufacturing of machine components.

Content

Casting techniques
Shape manufacturing methods
Powder metallurgical manufacturing methods
Sheet metal and joining technology
Cutting manufacturing methods
Basics of numerical control
Cutting production methods
Measurements in engineering technology
Assembly and installation

IE00BE07 Basics of Realtime Programming: 5 op**Credits**

5 - 5

Objectives

After completing this course the student is able to:

- program a micro controller or a programmable logic controller
- use different data types, variables, condition and loop statements correctly
- design a simple program architecture
- use a version control system

Content

- Definition of realtime (deterministic) system
- Basics of programming:
 - Data types
 - Variables
 - Condition statements
 - Loop statements
 - Functions/Function blocks
 - Subprograms
- Basic architectures (state machine etc.)
- Version control

Assessment scale

Five step scale

IM00BD26 Communication Skills for Engineering Students: 5 op**Credits**

5 - 5

Objectives

After completing the course, the student is able to:

- Communicate in different spoken and written contexts related to engineering studies
- Read, write, listen and talk in English about topics related to the student's engineering field
- Use grammatical structures typical in the context of the study field
- Follow Savonia reporting practices concerning the academic reporting language, reference techniques and the use of the reporting template
- Search information for study purposes and evaluate information sources critically
- Understand job application process and create a CV and a job application message
- Interact and collaborate in an intercultural context

Content

- Oral and written communication related to the engineering studies
- Engineering vocabulary and terminology
- Technical texts and related grammatical structures
- Product and process descriptions
- Job application process and documents
- Presentation skills
- Academic and technical reporting with focus on Savonia reporting practices
- Critical Information retrieval

Further information

It is recommended to do the course 'Orientation Project' at the same time with this course. Some tasks may be linked to the project course.

IE23SP-1016 Professional Studies: 120 op**Optionality**

All compulsory

IE23SP-1020 Professional Studies: 120 op**Optionality**

All compulsory

4_EXX8130 Mathematics 3: 5 op**Credits**

5 - 5

Objectives

The student can solve the most common differential equations and is able to apply them in engineering applications. The student is able to use classical probability and the most common distributions to model random events. He/she knows the basics of statistical inference and hypothesis testing.

Content

- Differential equations: separable equation, first order linear equation, second order linear equation
- Combinatorics and probability
- Random variable and distribution
- Discrete and continuous distribution
- Parameter estimation and statistical tests

Prerequisites

Mathematics 1, Mathematics 2

4_EIA8060 Basics of Electrical Engineering: 5 op**Credits**

5 - 5

Objectives

The 2 ECTS section of physics included in this course is an introduction to electromagnetism. After finishing this section the student understands the concepts of electric field, potential and voltage and will be able to apply these concepts in the calculation of simple DC circuits. The student knows the operation principles of a resistor, a capacitor and voltage supply as electrical circuit components. In addition, the student understands the concept of magnetic field and is able to apply magnetic force influence on a conductor or a current loop in a magnetic field. Based on these concepts the student understands the concept of electromagnetic induction and the operation principles of an electrical motor and generator.

After completing the 3 ECTS section of electrical engineering the student is able to make simple AC circuit analysis calculations. The student knows the basics of the electrical safety and is able to operate electrical equipment safely. The student knows the operation principle of the transformer as well as the most common electrical motor types. The student knows the main criteria for electrical device rating and is able to select protective devices for an electrical drive.

Content

PHYSICS

Electric field

Potential

DC circuits

Magnetic field

Electromagnetic induction

ELECTRICAL ENGINEERING

Legislation on the electrical safety

Legislation on the electrical competency, laymen vs. professionals

Electrical installation work permitted to everyone

Electrical installation work permitted only to the licensed professionals

EC directive on machinery, electrical systems as a part of machine

The basics of AC circuits analysis

- Alternating voltage and current, phase shift
- Active, reactive and apparent power, power factor
- 3-phase system operation and calculation principles

Transformer

Electrical motor

Electrical system dimensioning and protection principles

Frequency converter

Laboratory exercises

4_EIA8100 Manufacturing Technology 2: 5 op

Credits

5 - 5

Objectives

The student is able to create product models for sheet metal parts. In addition, the student is able to draw up manufacturing drawings of sheet metal parts with tolerance and welding symbols. The student understands the factors affecting manufacturability of sheet metal parts. The student is able to take into account the effect of different materials in sheet metal cutting, bending and welding. The student knows welding safety issues. The student becomes familiar with the key concepts in welding technology. In addition, the student becomes familiar with the most common welding processes and their characteristics and the principles of welding device technologies. The student will know the most common welding groove manufacturing methods and will obtain the basics in repair welding, welding quality assurance and economic factors of welding. The student gets an understanding of a sheet metal manufacturing process, from its design to finished products.

Content

Sheet metal production technology

Plate materials, their properties and areas of use

Manufacturing methods of sheet metal products and their distinctive features

Sheet metal automation

Design rules of sheet metal products

3D modeling of sheet metal components and creation of shop drawings with appropriate markings and symbols

Welding technology

Basic concepts of welding technology, terminology and standards

Manufacturability of welded structures

Welding of steel and light metal alloys

Safety issues of welding and cutting processes

Welding processes and their equipment

Welding groove preparation methods

Basics of repair welding

Economics of welding

Sheet metal and welding exercises

4_EIA8020 Mechanics: 5 op**Credits**

5 - 5

Objectives

The students learn the basics of mechanics laws of statics. The students know how to calculate reaction forces of rigid body and how to determine the internal force diagram of a beam.

Content

The basic laws of statics
Static equilibrium of a particle
Static equilibrium of rigid body
Center of gravity
Internal force system of beams, shear force and moment
Loss factor of mechanical devices

IE00BD49 Basics of Automation Technology: 5 op**Credits**

5 - 5

Objectives

After completing this course the student is able to:

- choose an appropriate sensor type for industrial applications
- choose an appropriate actuator for industrial applications
- plan and make necessary communication connections between automation system components
- make a simple logic control program to control an automation system

Content

- machine safety
- sensors
- control units
- actuators
- communication technology

Assessment scale

Five step scale

IE00BD50 RDI Project: 5 op**Credits**

5 - 5

Objectives

After completing this course, the student is able to:

- understand product development processes and workflow
- understand the link between the product development and production

- work as a member of a multidisciplinary product development group
- understand the computer-aided programs the companies use in product development and production
- produce project documentation in English
- use common project meeting practices and related documentation of meetings
- present the goals of the project, interim reports and final results by using a variety of presentation techniques and tools

Content

After completing this course the student can:

- Understand product development processes and workflow
- Understand the link between the product development and production
- Work as members of a multidisciplinary product development group
- Understand the computer-aided programs the companies use in product development and production
- Produce project documentation in English
- Use common project meeting practices and related documentation of meetings
- Present the goals of the project, interim reports and final results by using a variety of presentation techniques and tools

4_EIA8070 Physics for Mechanical Engineering: 5 op**Credits**

5 - 5

Objectives

After having passed the course, the student understands the kinematics and dynamics of a rigid body in rotational motion. He/she masters the determination of the moment of the inertia by using tables and applying Steiner's rule. The student knows how to treat fluids in laminar flow. The student will gain the basic understanding of phenomena on atomic and nuclear scales and their practical applications in engineering. The student will gain experience in making physical measurements and reporting the results in written form. He/she will also know how to perform the error analysis for the calculations based on the measurements.

Content

Kinematics and dynamics of rotational motion
Determining the center of mass and moment of inertia
Laminar flow of fluids
Atomic and nuclear structure
Radioactive radiation and its applications
Physical measurements and error analysis
Writing a report

Prerequisites

Physics for Engineering

4_EIA8050 Fundamentals of Strength of Materials: 5 op**Credits**

5 - 5

Objectives

The goal of the course is to learn the general principals of strength calculation. After the course the student is able to calculate simple mechanical cases like normal stress or bending stress.

Content

Terms of strength calculation. Mechanical properties of materials

Axial load

Stress and strain

Determination of safety factor

Shear stress

Bending stress and deformation of beam

Torsion

Linear buckling

General state of stress

Von Mises and Tresca criterions

4_EIA8220 Data Management and ERP: 5 op**Credits**

5 - 5

Objectives

The student understands the basic software architecture and how an ERP system uses the data that is needed in current business life. Also the student understands how the data model is designed and organized in the database.

The student understands the basic ERP system architecture and why this kind of software is needed. The student knows the main modules of the ERP system and the importance of them. The student can use the ERP system in a way it is used in daily business.

Content

Software (ERP) Projects

Data Design

Database

Forms

Reports

Use of ERP System

Logging

Basic data (company info, currencies, ...)

Materials

Customers

Production

Purchasing

Storage

Shipping
Accounting

IE00BD52 Supply chain and Network Management: 5 op**Credits**

5 - 5

Objectives

After completing the course, the student is able to:

- understand cooperation strategies
- identify and analyze supply chain process from networking point of view
- implement modern business cooperation networks

Content

Networking as a business strategy. Expediting, controlling and auditing the network. External and internal business networks. Risk management.

Assessment scale

Five step scale

IM00BD22 Leadership and Teamwork: 5 op**Credits**

5 - 5

Objectives

After completing the course, the student is able to:

- identify the meaning and value of good leadership
- define different types of teams and what makes a high performing team
- analyze the importance of self-leadership
- define and resolve team conflict and dysfunction

Content

Leadership in multicultural business environment. Self-leadership and motivation. Teamwork from different perspectives.

Assessment scale

Five step scale

IE00BD87 Quality Management: 5 op**Credits**

5 - 5

Objectives

After completing the course, the student is able to:

- define the meaning of quality in industrial engineering
- explain the importance of quality management

Content

Basics of quality and quality strategy. Quality Management Systems and standards. Quality Audit.

Assessment scale

Five step scale

IE00BD53 Entrepreneurship: 5 op**Credits**

5 - 5

Objectives

After completing the course, the student is able to:

- understand the meaning of entrepreneurship
- identify where a business idea comes from
- develop a business idea into a functioning business

Content

- Concepts of entrepreneurship
- A business plan.
- A business idea and pitching.

Assessment scale

Five step scale

IE00BD55 Design of Machine Parts: 5 op**Credits**

5 - 5

Objectives

After completing this course the student is able to:

- apply the general principles of machine design
- define machine parts' structural strength calculation requirements
- do dimensioning for axles and define stresses and strains
- design a weld for static load according Eurocode 3
- design a bolt joint and calculate tension and tightening torque
- do bearing calculations and define lifetime in different lubrication circumstances

Content

After completing this course the student can:

- Apply machine design general principles
- Can define machine part structural strength calculation requirements

- Can do dimensioning for axles and define stresses and strains
- Can design a weld for static load according Eurocode 3
- Can design a bolt joint and calculate tension and tightening torque
- Can do bearing calculations and define lifetime in different lubrication circumstances

Prerequisites

- Fundamentals of strength of materials
- 3d-modelling

Assessment scale

Five step scale

IE00BD56 Fundamentals of Hydraulics: 5 op**Credits**

5 - 5

Objectives

After completing the course the student is able to:

- understand the basic concepts related to hydraulics
- recognize typical hydraulic systems, as well as what components they consist of
- explain the basics of flow technology, based on which the student develops an understanding of the dimensioning of hydraulic components and systems
- read system diagrams
- understand the basic knowledge of hydraulic power transmission
- to design and dimension simple systems.

Content

- the basic components of hydraulic technology, drawing symbols, and documentation
- the basics of flow technology
- the basic concepts of machine control
- operation of hydraulic equipment (pumps, motors, valves)
- hydraulic power transmission, system types and comparison with other forms of power transmission.

Assessment scale

Five step scale

IE00BD58 Fundamentals of Pneumatics: 5 op**Credits**

5 - 5

Objectives

After completing the course, the student is able to

- define the basic concepts related to pneumatics
- describe typical pneumatic systems, as well as what components they consist of
- understand the basics of flow technology, based on which the student develops an understanding of the dimensioning of pneumatic components and systems.

- read system diagrams
- understands the basic knowledge of pneumatic power transmission
- design and dimension simple compressed air systems.

Content

- the basic components of pneumatics, drawing symbols, and documentation
- the basics of flow technology from the perspective of compressed air
- the basic concepts of machine control
- the operation of compressed air equipment (compressors, motors, valves)

Assessment scale

Five step scale

IE00BD60 Control System Definition & Design: 5 op

Credits

5 - 5

Objectives

After completing the course, the student has

- the basic skills related to the definition of the control system and is able to
- understand the interfaces in control systems (mechanical, hydraulic, electrical, software) and the ability to move in there
- knows how to define a simple specification of electricity, automation, software and hydraulics as the starting information for planning
- understand the physical chain of mechanical power, hydraulic power transmission, electrical control, software control, mechanical controlled movement.

Content

- a controlled and guided movement/function
- instrumentation, component selection and the interdependencies between them from the perspective of specification

Prerequisites

Fundamentals of Hydraulics
Basics of automation technology
Basics of electrical engineering
Basics of real time programming
Design of machine parts
Or similar knowledge

Assessment scale

Five step scale

IM00BD29 Communication Skills for Engineering Experts: 5 op

Credits

5 - 5

Objectives

After completing the course, the student is able to:

- Communicate in different spoken and written contexts related to intercultural working life, e.g. in projects
- Make the difference between different communication styles, and e.g. produce formal and informal messages
- Participate in meetings and negotiations in different roles and create related documents
- Develop documents needed in job application further and participate in job interviews
- Plan and give professional presentations on various technical topics
- Make summaries and reports following Savonia reporting guidelines
- Recognize how to develop one's skills further and give feedback to others

Content

- Communication skills in work-related situations
- Corporate communication
- Business writing and styles
- Presentation skills
- Meeting skills
- Negotiation skills
- Job application process
- Job interviews
- Reporting
- Project communication

Further information

It is recommended to do this course with a project course running at the same time.

Assessment scale

Five step scale

4_EKV1100 Machine Simulation Basics: 5 op**Credits**

5 - 5

Objectives

Student knows how to fill a specification sheet from real mobile machine to model a simulation model to Mevea software.

Student knows to model a simulation model to Mevea software.

Content

The use of Mevea multibody dynamic software.

Prerequisites

Basic knowledge of dynamics, hydraulics and automation.

IE00BD61 Mechanical Engineering Project 1: 5 op

Credits

5 - 5

Objectives

After completing this course, the student is able to:

- apply the professional skills learned on previous courses to a mechanical engineering project
- plan a mechanical engineering project
- lead a mechanical engineering project
- document a mechanical engineering project

Content

- mechatronics project
- project management
- project documentation

Assessment scale

Five step scale

IE00BD62 Control System Implementation: 5 op**Credits**

5 - 5

Objectives

After completing this course the student is able to:

- read a machine control system specification
- read machine control system designs
- make a simple machine controls system according to specification and design documents
- verify that control system works according to specification

Content

- control system building
- control system commissioning
- system testing
- system verification

Prerequisites

Control system definition and design or similar knowledge.

Assessment scale

Five step scale

IE00BD63 Mechatronics: 5 op**Credits**

5 - 5

Objectives

After completing this course the student is able to:

- understand the mechatronics as a discipline and technical solution to solve problems
- identify the role of mechanics, and hydraulic, pneumatic, electrical and digital parts of a machine
- understand the language and documentation of all disciplines involved in mechatronics
- produce documentation bridging the gaps between different disciplines in mechatronics
- communicate with all design parties involved in designing a mechatronic system

Content

- introduction to theoretical and applied mechatronics
- design and operation of mechatronics systems
- special considerations of working with inter-disciplinary systems
- documentation of mechanical, hydraulic, pneumatic, electrical and digital systems
- communication inside and between multi-disciplinary teams

Assessment scale

Five step scale

IE00BD64 Industrial Robotics & Production Automation: 5 op**Credits**

5 - 5

Objectives

After completing this course, the student

- can tell the importance of the application of robotics and automation in industrial production
- can identify and choose correct various industrial robots and their applications.
- knows the structure, components and operating principle of robotic automation systems
- can program a simple industrial robot system
- recognizes the characteristics of piece goods and process automation
- can use modern tools for simulation of mechatronics and robotic systems.

Content

- value of automation and robotics
- industrial robot types
- industrial robot components, structure and operating principles
- robot programming
- piece goods and process automation
- simulation of industrial robotics and automation

Assessment scale

Five step scale

IE00BD65 Mechanical Engineering Project 2: 5 op**Credits**

5 - 5

Objectives

After completing this course, the student is able to

- apply the professional skills learned on previous courses to a mechanical engineering project
- plan a mechanical engineering project
- lead a mechanical engineering project
- document a mechanical engineering project

Content

- mechatronics project
- project management
- project documentation

Assessment scale

Five step scale

IE23SP-1017 Elective Studies: 15 op

Optionality

Select x cr

Credits

15 - 15

IE23SP-1021 Elective Studies: 15 op

Optionality

Select x cr

Credits

15 - 15

IE23SP-1018 Internship: 30 op

Optionality

All compulsory

IE23SP-1022 Internship: 30 op

Optionality

All compulsory

EX00BD39 Internship 1: 5 op

Credits

5 - 5

Objectives

After completing the course the student is able to

- recognize different jobs in the field of education
- apply to jobs suitable for Internship 1
- make an internship contract and write an internship report

- evaluate his/her professional competencies and development needs
- observe the workplace's requirements and practices

Content

Applying for a job. Making an internship contract. Working in an internship place. Writing an internship report

Assessment scale

Five step scale

EX00BD40 Internship 2a: 5 op**Credits**

5 - 5

Objectives

After completing the course the student is able to

- apply to jobs suitable for Internships 2-3 and plan his/her career path
- make an internship contract and write an internship report
- work and follow guidance in practical tasks that are central to the professional field
- apply the knowledge and skills learned at studies into practice
- recognize and follow the industry's requirements and practices, and understand the company's operations
- evaluate his/her professional competencies and development needs

Content

Applying for a job. Making an internship contract. Working in an internship place. Writing an internship report.

Assessment scale

Five step scale

EX00BD41 Internship 2b: 5 op**Credits**

5 - 5

Objectives

After completing the course the student is able to

- apply to jobs suitable for Internships 2-3 and plan his/her career path
- make an internship contract and write an internship report
- work and follow guidance in practical tasks that are central to the professional field
- apply the knowledge and skills learned at studies into practice
- recognize and follow the industry's requirements and practices, and understand the company's operations
- evaluate his/her professional competencies and development needs

Content

Applying for a job. Making an internship contract. Working in an internship place. Writing an

internship report.

Assessment scale

Five step scale

EX00BD42 Internship 3a: 5 op**Credits**

5 - 5

Objectives

After completing the course the student is able to

- apply to jobs suitable for Internships 2-3 and plan his/her career path
- make an internship contract and write an internship report
- work and follow guidance in practical tasks that are central to the professional field
- apply the knowledge and skills learned at studies into practice
- recognize and follow the industry's requirements and practices, and understand the company's operations
- evaluate his/her professional competencies and development needs

Content

Applying for a job. Making an internship contract. Working in an internship place. Writing an internship report.

Assessment scale

Five step scale

EX00BD43 Internship 3b: 5 op**Credits**

5 - 5

Objectives

After completing the course the student is able to

- apply to jobs suitable for Internships 2-3 and plan his/her career path
- make an internship contract and write an internship report
- work and follow guidance in practical tasks that are central to the professional field
- apply the knowledge and skills learned at studies into practice
- recognize and follow the industry's requirements and practices, and understand the company's operations
- evaluate his/her professional competencies and development needs

Content

Applying for a job. Making an internship contract. Working in an internship place. Writing an internship report.

Assessment scale

Five step scale

EX00BD44 Internship 3c: 5 op**Credits**

5 - 5

Objectives

After completing the course the student is able to

- apply to jobs suitable for Internships 2-3 and plan his/her career path
- make an internship contract and write an internship report
- work and follow guidance in practical tasks that are central to the professional field
- apply the knowledge and skills learned at studies into practice
- recognize and follow the industry's requirements and practices, and understand the company's operations
- evaluate his/her professional competencies and development needs

Content

Applying for a job. Making an internship contract. Working in an internship place. Writing an internship report.

Assessment scale

Five step scale

THESIS Thesis: 15 op**Duration (years)**

0

Primary teaching language

English

Details**Person in charge**

Jari Linden

Description**Description**

Thesis Planning (5 ECTS)

Thesis Implementation (5 ECTS)

Thesis Finalisation (5 ECTS)

Further information

The student shall acquire the material required for the thesis him/herself. Savonia's thesis reporting instructions.

The student may create an individual yet appropriate timetable for the thesis process.

Curriculum development and working life cooperation

The thesis is always working life oriented. It may take the form of a

- a) development work planned and implemented by a student or a group of students to meet the user's or client's needs. Development may focus on a product, service, process, working method, learning material or instruction, digital material, supervised activity etc. The student shall present the plan, its implementation and its evaluated output and the need for further development in a report whose form is suitable for the professional field in question.
- b) research-based thesis, in which a student or a group of student approaches a practical problem or item to be developed with appropriate research methods. The student shall prepare a report describing the planning, implementation and results of the thesis and interpreting the results.
- c) production, in which a student of a group of students demonstrates competence as an expert or as an artist by planning and implementing an event, a seminar, an artistic performance etc. The student shall present the plan, its implementation and its evaluated output in a report whose form is suitable for the professional field in question.
- d) compiled thesis, in which parts planned as a thesis (e.g. projects) are implemented and reported. In the written synthesis, article or other publication, which is part of the thesis, the student shall present the essential results/output in a form that is suitable for the professional field in question.

Objectives

Student can

- choose a topic for thesis that is suitable for his or her field and his or her professional development and justify the choice from different perspectives
- plan and implement a working life oriented research and development work based on the needs of the user/client
- apply scientific and evidence-based information in the thesis process and in the development of his or her expertise
- appropriately use research and development methods or artistic methods that are suitable for his or her professional field and for the topic of the thesis
- prepare a clearly defined, logical and professionally appropriate report on his or her thesis
- evaluate the essential contents, results or output of his or her thesis and justify their significance from the perspectives of his or her field, the client's/user's need and his or her professional development
- evaluate his or her thesis process, its reliability and ethicality as well as his or her professional growth and learning during the work
- cooperate in a flexible manner with players involved in the thesis process and demonstrate his or her expertise
- take the maturity test on his or her thesis.

Optionality, prerequisites and offering information

Optionality

All compulsory

Prerequisites

Research methodology studies of the degree programme.

THESIS-1001 Thesis: 15 op

Optionality

All compulsory

XT00BA53 Thesis Planning: 5 op**Credits**

5 - 5

Objectives

The student can

- choose a topic that is relevant for the development of both the field of study and his/her own expertise
- motivate his/her topic choice from various viewpoints
- create a thesis topic proposal and complete it into a thesis plan (= work plan)
- work flexibly with other people and parties involved in the thesis process
- present his /her knowledge and skills.

Content

Selecting a thesis topic and narrowing it down. Writing a thesis topic proposal. Signing a thesis project agreement. Finding a thesis supervisor. Information retrieval and reporting practices. Writing a thesis plan (= work plan) and finding source materials.

Further information

The student may create an individual yet appropriate timetable for the thesis process.

Prerequisites

Research methodology studies of the degree programme.

Assessment scale

Five step scale

XT00BA54 Thesis Implementation: 5 op**Credits**

5 - 5

Objectives

The student can

- implement a working-life-oriented research and development project, which meets the needs of a user/client
- apply scientific and evidence-based knowledge to the thesis process in order to increase and develop his/her expertise
- create a report that is concise and logical and meets the professional standards of his/her field of study.
- assess the main contents, results and outcomes of the thesis and discuss their relevance to the field, the needs of a user/the client and the development of his/her expertise
- work flexibly with other people and parties involved in the process and demonstrate his/her expertise

Content

- working independently on the thesis
- guidance related to the various phases of the thesis
- the results/outcome of the thesis
- presentation of the thesis in a seminar

Further information

The student may set an individual yet appropriate timetable for his/her thesis process.

Prerequisites

Research methodology studies of the degree programme.

Course: Thesis Planning (5 ECTS).

Assessment scale

Five step scale

XT00BA55 Thesis Finalisation: 5 op**Credits**

5 - 5

Objectives

The student can

- create a report that is concise and logical and meets the professional standards of his/her field of study
- assess the main contents, results and outcomes of the thesis and discuss their relevance to the field, the needs of a user/the client and the development of his/her expertise
- assess the thesis process, its reliability and ethicalness as well as his/her professional growth and development
- work flexibly with other people and parties involved in the process and demonstrate his/her expertise
- write a maturity test essay on the thesis process.

Content

- finalizing the thesis as well as writing and editing the report based on the feedback received in the thesis seminar and from the thesis supervisor
- detection of plagiarism
- submitting the thesis for assessment

Further information

The student may set an individual yet appropriate timetable for the thesis process.

Prerequisites

Research methodology studies of the degree programme.

Courses: Thesis Planning (5 ECTS) and Thesis Implementation (5 ECTS).

Assessment scale

Five step scale

XT00BA56 Maturity Test: 0 op

Credits

0 - 0

Objectives

The student can

- write the maturity test showing expertise in the field of his/her studies and proficiency in communication and language skills
- discuss the maturity test task/ question in a logical manner, showing professional competence and with relevance to the task
- summarise his/her thesis and focus on the essential concepts, facts and findings
- write a professional text in the appropriate style and without grammar mistakes.

Content

Enrolling to and writing the maturity test.

Further information

The information on student's maturity test is included in the degree certificate.

Prerequisites

Completion of Thesis (15 ECTS)

Assessment scale

Five step scale